

an article conveyor for conveying said articles in a linear article path through said article pickup station;

a case conveyor having a common transport surface supporting and transporting a plurality of indexed cases in generally fixed positions relative to said transport surface for transport along an arcuate case transport path;

a turret including a plurality of transfer arms continuously rotating about a single vertical axis;

a plurality of pickup heads carried by said transfer arms rotating along a main radial path for transferring the articles from the pickup station to the release station successively into said cases;

a plurality of grid heads having pivoting grid fingers arranged in a grid array corresponding to an array of the articles to be picked up, said grid fingers defining grid chutes having upper ends and lower ends for receiving the articles; said grid heads being carried by said transfer arms in alignment with said pickup heads;

said pickup heads having an array of article gripper elements corresponding to the array of grid chutes and the articles for gripping the articles;

a pickup head actuator mechanism for actuating said gripper elements to selectively grip and release the articles;

a motion converter operatively connected between said pickup heads and grid heads and said rotating turret causing said pickup and grid heads to swivel about a secondary swivel axis and depart from said main radial path, move along a straight-line path through said pickup station, return to the main radial path after passing through the pickup station, and move along the main radial path without swiveling; and

a vertical motion mechanism for controlling relative vertical positions of said pickup and grid heads during article pickup and transfer of the articles between said pickup and release stations as said turret rotates about said vertical axis.

Claim 120 (new). The apparatus of claim 119 wherein said motion converter maintains said pickup and grid heads generally in fixed positions relative to said main radial path and said case transport path after return to said main radial path.

Claim 121 (new). The apparatus of claim 120 including case indexes carried by said case conveyor indexing and transporting said cases on said conveyor in said generally fixed positions on said common transport surface.

Claim 122 (new). The apparatus of claim 119 wherein said motion converter includes support frames carried by said turret, said pickup heads being slidably carried by said support frames to rotate about said secondary swivel axis during said swiveling whereby said pickup heads maintain said straight-line motion through said pickup station.

Claim 123 (new). The apparatus of claim 122 wherein said connector mechanism is constructed and arranged to move said pickup heads in a rotary and a translatory motion when said pickup and grid heads swivel about said second swivel axis.

Claim 124 (new). The apparatus of claim 123 wherein said connector mechanism includes a first articulating linkage arrangement connected near one side of said pickup and grid heads and a second articulating linkage arrangement connected near another side of said pickup and grid heads for effecting movement of said pickup and grid heads in said straight-line path.

Claim 125 (new). The apparatus of claim 124 including at least one fixed cam carried by a stationary support, and cam followers carried by said first and second articulating linkage arrangements engaged with said cam for imparting said movement to said pickup and grid heads.

Claim 126 (new). The apparatus of claim 125 wherein said first and second linkage arrangements include respective first and second vertical rotary cam shafts connected to said cam followers, and upper and lower arm links are slidably carried by said first and second rotary cam shafts connected to said pickup and grid heads for articulating said heads about said secondary swivel axis as said cam shafts rotate.

Claim 127 (new). The apparatus of claim 119 wherein said pickup head actuator mechanism includes an engagement member carried at said release station, and operators carried by said pickup heads which strike said engagement member at said release station whereby said operators are moved to a release position for releasing the articles.

Claim 128 (new). The apparatus of claim 127 including a latch operatively associated with said pickup heads for latching said operators in said release position, and an unlatching device carried at said pickup station for releasing said latch so that said pickup heads grip the articles.

Claim 129 (new). The apparatus of claim 128 including a second engagement member carried at said pickup station for urging said operator downward to remove pressure from said latch to aid said unlatching device in releasing said latch whereby said gripper elements grip the articles for pickup, and said first and second engagement members are carried in a fixed relationship by said turret.

Claim 130 (new). The apparatus of claim 119 including a stationary support about which said turret rotates; and wherein said vertical motion mechanism includes first and second cams generally encircling said stationary support, a first cam roller associated with each said pickup head which rides on said first cam and a second cam roller associated with each said grid head which rides on said second cam whereby the vertical positions of said pickup and grid heads are controlled.

Claim 131 (new). The apparatus of claim 130 wherein said vertical motion mechanism includes guide bearings slidably supporting said pickup and grid heads on said transfer arms, and said first and second cam rollers being carried by said guide bearings.

Claim 132 (new). Apparatus for transferring articles from a pickup station to a release station in a continuous radial motion, said apparatus being of the type which includes a plurality of reciprocating pickup heads for picking up the articles at said pickup station and releasing the articles at said release station, and a vertical motion mechanism for moving said pickup heads to operative positions relative to the articles at said pickup and release stations, wherein said apparatus comprises:

- an article conveyor for conveying articles along a linear path through said pickup station;

- a case conveyor for transporting a plurality of cases in generally fixed positions on a common transport surface along a radial transport path to said release station;

- a rotating turret which continuously rotates about a substantially vertical turret;

a plurality of reciprocating pickup heads carried by said turret for movement along a main radial path corresponding generally to said radial transport path of the cases;

a pickup-head motion converter associated with said turret and operatively connected to said pickup heads, said motion converter causing said pickup heads to swivel about a secondary swivel axis and depart from said radial path and move generally in a straight-line path through the pickup station corresponding generally to said linear article path, and causing said pickup heads to return to said main radial path after passing through the pickup station to move without swiveling along said main radial path.

Claim 133 (new). The apparatus of claim 132 wherein said case conveyor has an arcuate shape with a curvature generally corresponding to the curvature of the main radial path of said pickup heads.

Claim 134 (new). The apparatus of claim 132 wherein said pickup-head motion converter includes articulating connector mechanisms swiveling said pickup heads to effect said straight-line path.

Claim 135 (new). The apparatus of claim 134 wherein said motion converter includes support frames carried by said turret, said pickup heads being slidably carried by said support frames to rotate about said secondary swivel axis through said pickup station and maintain said straight-line motion through said pickup station.

Claim 136 (new). The apparatus of claim 135 wherein said articulating connector mechanisms are constructed and arranged to move said pickup heads in a

rotary and a translatory motion when said pickup heads swivel about said secondary axis on said frames.

Claim 137 (new). The apparatus of claim 136 wherein said articulating mechanisms include vertical cam shafts carried by said turret, articulating linkage arrangements connected between said cam shafts and said pickup heads for imparting said motion to said pickup heads; and said linkage arrangements being slidably carried by said cam shafts to slide up and down as said pickup heads reciprocate vertically during pick up and release of the articles.

Claim 138 (new). The apparatus of claim 137 including a stationary support about which said turret rotates; cam followers connected to said articulating linkage arrangements, and at least one cam carried by said stationary support which said cam followers follow to impart said straight-line motion to said pickup heads.

Claim 139 (new). A method of continuously transferring articles between a pickup station and a release station comprising:

feeding a plurality of articles along a linear path through a pickup station;

conveying cases along a case transport path;

providing a plurality of pickup heads arranged in a circle to rotate about a single vertical axis;

providing a release station along said main radial path where the articles are released and deposited after pickup;

rotating pickup heads about the central axis along a main radial path causing the pickup heads to depart from the main radial path by swiveling the pickup

heads about a secondary swivel axis to move in a straight line path through the article pickup station;

returning the pickup heads to the radial path after passing through the pickup station; and causing said pickup heads to move without swiveling along the main radial path; and

releasing the articles at the release station along the radial path.

Claim 140 (new). The method of claim 139 including providing a rotating turret carrying said pickup heads for rotation along said main radial path; providing linkage mechanisms connected between said turret and said pickup heads; and swiveling the pickup heads about their secondary swivel axis by actuating said linkage mechanisms through the pickup station.

Claim 141 (new). The method of claim 140 including swiveling said pickup heads about the secondary swivel axis to move the pickup heads in rotary and transitory motions through the pickup station to effect said straight-line path.

Claim 142 (new). The method of claim 139 including conveying cases on said case conveyor having a common case support.

Claim 143 (new). The method of claim 142 including conveying said cases generally and without change in the direction of the cases relative to the transport surface.

Claim 144 (new). The method of claim 142 including maintaining the pickup heads in generally fixed relative positions along the main radial path whereby the orientation of the cases and positions of the pickup heads relative to each other remain generally fixed along the main radial path.